App. No. 10/522,887
Office Action Dated June 6, 2008

REMARKS

Favorable reconsideration is respectfully requested in view of the above amendments and following remarks. The specification has been amended to address formal issues. Claims 17, 19 and 20 have been amended editorially. No new matter has been added. Claims 17-20 and 23-25 are pending.

Claim Objections

Claims 19 and 20 have objected to because of informalities. Claims 19 and 20 have been amended, taking the issues noted in the objection into account.

Withdrawal of the objection is respectfully requested.

Claim rejections - 35 U.S.C. § 112

Claims 23 and 24 are rejected under 35 USC 112, first paragraph, as failing to comply with the written description requirement. The specification has been amended to include data that clearly describes the level of increase in SOD activity of the transgenic rice variety as compared to non-transgenic plants. As the data is derived from Fig. 1a, the submission of the data does not constitute new matter. Accordingly, Applicants respectfully submit that claims 23 and 24 comply with the written description requirement.

Withdrawal of the rejection is respectfully requested.

Claim rejections - 35 U.S.C. § 103

Claims 17-20 and 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bowler et al. (European Patent Publication No. EP 0359617A2) in view of Tanaka et al. (Plant Science, 148: 131-139, 1999). Applicants respectfully traverse the rejection.

The rejection contends that given that Tanaka clearly suggests making salt tolerant transgenic rice overexpressing chloroplast targeted MnSOD, one of ordinary skill in the art would have been motivated to transform any cultivated rice variety including Indica varieties with Bowler's DNA construct to arrive at the instantly claimed invention with reasonable expectation of success. Applicants respectfully submit that the rejection is relying on the improper use of hindsight in the interpretation of Tanaka.

In particular, Tanaka notes on column 1 of page 136 that several groups have generated transgenic plants that overexpress SODs in order to enhance tolerance to oxidative stress, including paraquat, i.e., methyl viologen ("MV"), such as taught by Bowler. Bowler notes that

experiments with MV provides a convenient model system to study alterations in the physiological state of transgenic plants overexpressing the MnSOD, and that results are expected to have a direct bearing on situations in which plants are subjected to natural, superoxide radical-producing, stress conditions (see page 12, lines 1-10 of Bowler).

However, Tanaka notes that attempts to enhance tolerance to oxidative stress by treating with MV have been successful to various degrees (see col. 1, page 136 of Tanaka). Tanaka explains that from the correlation studies between the activities of antioxidant enzymes and the oxidative stress tolerance, it has been postulated that SOD overexpression leads to enhancement of the tolerance to oxidative stress only if one or more of antioxidant enzymes such as APX, dehydroascobate reductase, and monodehydroascorbate reductase are present at high levels, but indicates that any correlation of salt tolerance with antioxidant enzyme levels remain controversial (*Id*). Tanaka further notes that study on salt tolerance of transgenic plants overexpressing SOD has only been reported by Van Camp et al. (*Id*)

While Tanaka has shown that when Mn-SOD is overexpressed in Sasanishiki, the plant shows an increase in total SOD activity and exhibits enhanced tolerance to salt stress (NaCl treatments), Tanaka notes that as a result of the different experimental conditions between the previous study and theirs (use of Sasanishiki as opposed to tobacco, which is a dicotyledonous plant; and use of NaCl as opposed to MV treatments), it is difficult to compare the results (see col. 2, page 136 of Tanaka). One notable aspect mentioned by Tanaka is that under salt stress conditions, the activities of SOD and APX in the transgenic rice had 1.5 to 2.0-fold higher than that in the control rice whereas those in the transgenic tobacco were similar to that in the control tobacco (*Id*). Tanaka in fact notes that since SOD produces H_2O_2 which can react with superoxide anions to form hydroxyl radical, a highly toxic reactive oxygen species, high level of SOD might not produce salt-resistant plants (*Id*). Thus, it can be clearly understood from this discussion that the reference teaches that stress tolerance is a complicated mechanism with multiple players, and that results from one particular plant cannot be generalized to other plants.

As indicated before, it has been well established that Indica and Japonica groups can be separately classified under Oryza sativa based on physiological and morphological traits including drought tolerance, potassium chlorate resistance, phenol reaction, plant height and leaf color (Oka et al., 1958, 1988), thereby indicating that the two may not share the same mechanism

for stress tolerance. Moreover, there are numerous reports which reveal distinct genetic patterns between Indica and Japonica (Thompson et al., 2002). There are in fact large differences in physiological traits between Japonica and Indica. For example, studies have shown that Indica rice exhibits higher transpiration rates than Japonica rice (Peng et al., 2006). Such differences allow the plants to thrive in different growth habitats such as lowlands of tropical Asia (Indica) and upland hills of southern China and Indonesia (Japonica). Indica rice in fact is much more varied, cultivated and susceptible to environmental stresses. Given such differences, there is no reasonable basis from Tanaka itself to conclude that Tanaka's studies in Sasanishiki would lead to a predictable application in Indica rice variety. As noted above, Tanaka in fact notes that high level of SOD might not produce salt-resistant plants, and thus, Applicants respectfully submit that Tanaka represents nothing more than an invitation to experiment. Similar to Tanaka, Bowler fails to provide experimental work or detailed explanation that would lead one to expect with any reasonable degree of certainty that transgenic Indica rice plants with superior resistance to paraquat treatment enjoyed by the present invention, demonstrated for example in the experimental work of the specification, could be achieved. Accordingly, claim 17and the dependent claims therefrom are patentable over Bowler and Tanaka for at least these reasons.

Favorable reconsideration and withdrawal of the rejection are respectfully requested.

In view of the above, favorable reconsideration in the form of a notice of allowance is requested. Any questions or concerns regarding this communication can be directed to the attorney-of-record, Douglas P. Mueller, Reg. No. 30,300, at (612) 455.3804.

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Respectfully submitted,

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